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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/564,469 | 01/13/2006 | Soichi Shibata | 043888-0432 | 9397 |

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| EXAMINER | |
|---|---|
| RADEMAKER, CLAIRE L | |
| ART UNIT | PAPER NUMBER |
| 1795 | |
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/564,469 | SHIBATA ET AL. | |
| | Examiner | Art Unit | |
| | Claire L. Rademaker | 1795 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *13 January 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1 and 4* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 4* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *13 January 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *1/13/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Specification*

1. The disclosure is objected to because of the following informality:

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: Pressure Differentials in a Fuel Cell System.

Appropriate correction is required.

2. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

### *Claim Rejections - 35 USC § 103*

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saito (JP 11-354143) in view of Imamura et al. (US 2004/0038098) and Meltser et al. (US 2004/0137258).

With regard to claim 1, Saito teaches a fuel cell system (paragraph [011]; Figure 1) comprising a fuel cell (20, paragraph [0011]; Figure 1), a fuel gas supply means (1, paragraph [0012]; Figure 1) for supplying a fuel gas to an anode of said fuel cell, an oxidant gas supply means (8, paragraph [0015]; Figure 1) for supplying an oxidant gas to a cathode of said fuel cell, and an inert gas supply means (32, paragraph [0016]; Figure 1) for supplying an inert gas to the anode of said fuel cell (paragraphs [0008], [0010], [013], & [0017]; Figure 1), where said fuel cell is subjected to a purge operation of replacing the fuel gas and in said fuel cell with an inert gas supplied from said inert gas supply means when said fuel cell is started up or shut down (paragraphs [0008], [0010], [013], & [0017]), wherein said fuel cell system further comprises control means (46, paragraph [0016]; Figure 1) for increasing or decreasing the amount of the purge gas supplied to said fuel cell (paragraph [0016]; Figure 1), but fails to teach a means for measuring pressure at the inlet-side flow paths leading to the anode and the cathode of said fuel cell, the specified relationship between the pressures at the anode inlet-side and cathode inlet-side, or the specified relationship between the pressure differentials during purge operation and during normal operation.

Imamura et al. and Saito are considered analogous art because they both involve the same field of endeavor: fuel cell systems.

Imamura et al. teaches means for measuring a pressure $P_a$ in an inlet-side flow path leading to the anode of said fuel cell (81, paragraph [0120]; Figure 9) and a pressure $P_c$ in an inlet-side flow path leading to the cathode (71, paragraph [0120];

Figure 9) in order to better control the pressure and thereby limit the water diffusion from the air electrode side through the electrolyte membrane to the fuel electrode side (paragraph [0058]), wherein the differential pressure $\Delta P$ is defined as $\Delta P = P_a - P_c$ (paragraphs [0057]-[0058]), thereby preventing the water residence around the electrode portions of the fuel electrode (paragraph [0058]), but fails to specifically state that $0 < \Delta P_o * \Delta P_p$.

It would have been obvious to one of ordinary skill in the art at the time of the invention to add the means for measuring pressures at the inlet-side flow paths leading to the anode and the cathode of Imamura et al. to the fuel cell system of Saito in order better control the pressure and thereby limit the water diffusion from the air electrode side through the electrolyte membrane to the fuel electrode side (paragraph [0058]). Furthermore, it would have been obvious to one of ordinary skill in the art at the time of the invention to add the concept of the pressure at the inlet-side of the anode being greater than the pressure at the inlet-side of the cathode of Imamura et al. during normal operation to the fuel cell system of Saito in order to prevent water residence around the electrode portions of the fuel electrode (paragraph [0058]).

While modified Saito fails to specifically state that $0 < \Delta P_o$, one of ordinary skill in the art would understand that because $\Delta P$ is defined as $\Delta P = P_a - P_c$ where $P_a > P_c$ (paragraphs [0057]-[0058]), $\Delta P_o$ must be greater than 0 (zero).

Modified Saito fails to teach that $\Delta P_p > 0$ and that $0 < \Delta P_o * \Delta P_p$.

Meltser et al. teaches the concept of controlling the pressure differential between the anode and the cathode of a fuel cell during purging operation (paragraph [0021])

where the pressure at the anode is greater than the pressure at the cathode (paragraph [0021]) in order to prevent and/or minimize possibility of membrane separation (paragraph [0021]).

Meltser et al. and Saito are considered analogous art because they involve the same field of endeavor: fuel cell systems.

It would have been obvious to one of ordinary skill in the art at the time of the invention to add the concept of controlling the pressure differential between the anode and the cathode where the pressure at the anode is greater than the pressure at the cathode of Meltser to the modified fuel cell system of Saito in order to prevent and/or minimize possibility of membrane separation during purging (paragraphs [0021] & [0005]).

While modified Saito fails to specifically state that $0 < \Delta P_p$, one of ordinary skill in the art would understand that because $\Delta P$ is defined as $\Delta P = P_a - P_c$ where $P_a > P_c$ (paragraphs [0057]-[0058]), $\Delta P_p$ must be greater than 0 (zero).

Modified Saito fails to specifically state that $0 < \Delta P_o * \Delta P_p$.

While modified Saito fails to specifically state that $0 < \Delta P_o * \Delta P_p$, one of ordinary skill in the art would understand that that because $0 < \Delta P_o$ (see above) and because $0 < \Delta P_p$ (see above), the product of $|\Delta P_o|$ and $|\Delta P_p|$ must be greater than 0 (zero).

Modified Saito fails to specifically state that $|\Delta P_p| < |\Delta P_o|$.

While modified Saito fails to specifically state that the differential pressure during purging ($\Delta P_p$) is less than or equal to the differential pressure during normal operation ($\Delta P_o$), it would have been obvious to one of ordinary skill in the art at the time of the

invention to maintain the differential pressure during purging ($\Delta P_p$) at or lower than the differential pressure during normal operation in order to prevent water residence around the electrode portions of the fuel electrode (Imamura et al, paragraph [0058]) and prevent and/or minimize possibility of membrane separation (Meltser et al., paragraph [0021]).

Imamura et al. and Meltser et al. are both teaching that the differential pressure during normal operation and during purging are result effective variables. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the differential pressures during purging and during operation because the courts have held that optimization of a results effective variable is not novel. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

With regard to claim 4, modified Saito fails to teach means for changing the internal diameter of an outlet-side flow path of an exhaust gas.

Meltser et al. teaches means for changing the internal diameter of an outlet-side flow path of an exhaust gas (42, paragraphs [0021]; Figure 1) in order to adjust the pressure of the air to be supplied to the fuel cell (paragraph [0021]).

It would have been obvious to one of ordinary skill in the art at the time of the invention to add the means for changing the internal diameter of an outlet-side flow path of an exhaust gas of Meltser et al. to the fuel cell system of modified Saito in order to adjust the pressure of the air to be supplied to the fuel cell (paragraph [0021]).

***Conclusion***

5. The prior art made of record and not relied upon which is considered pertinent to applicant's disclosure is as follows: Lamont et al. (US 2005/0277010) discloses a back pressure regulating device incorporated in a fuel cell system; Iguchi (US 2004/0009377) discloses a method of operating a fuel cell system wherein the fuel cell comprises pressure sensors at the electrode inlets and outlets on the fuel- and oxidant-side of the fuel cell; Skala et al. (US 2003/013416) discloses a fuel cell system comprising a controller which controls valves and the water and fuel metering devices based on the pressure differential signal between an inlet and an outlet; Sugawara et al. (JP 2002-373682) discloses a fuel cell system in which a differential pressure exists between the anode and the cathode, and where the differential pressure is controlled via a valve based on the pressure of the gaseous hydrogen.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Claire L. Rademaker whose telephone number is 571-272-9809. The examiner can normally be reached on Monday - Friday, 8:00AM - 4:30PM, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

CLR

SUSY TSANG-FOSTER
SUPERVISORY PATENT EXAMINER